I. Amendments to the Claims

This listing of claims replaces without prejudice all prior versions and listings of claims in the application. The claim amendments comply with 37 CFR 1.173(b)(2).

Listing of Claims:

1. (Amended) In a metallic material injection molding machine,

an injection nozzle joined to an injection barrel of said injection molding machine,

a stationary platen holding a portion of a mold,

a sprue bushing mounted in said mold,

said nozzle engaging said sprue bushing when said metallic material is injected through said nozzle and into said sprue bushing [into said mold],

at least one of said nozzle and said sprue bushing having a spigot portion, and at least the other one of said nozzle and said sprue bushing having a complementary channel formed therein,

wherein, in use, said spigot portion [which] extends into [a] said channel [in said sprue bushing], an outer periphery of said spigot fitting within a surface of

said channel so as to create a gap between [between] said surface and said periphery of said spigot that permits a limited amount of metallic material to enter the gap and solidify in the gap to form a seal and thereby prevent loss of metallic material through the interface between said nozzle and said sprue bushing during an injection cycle, said limited amount of material being attached to a sprue and removed therewith.

2. (Amended) The [In a] metallic material injection molding machine as in claim 1 wherein said metallic material comprises [is] a metal alloy.

3. (Amended) The [In a] metallic material injection molding machine as in claim 2 wherein said alloy is selected from alloys of magnesium, zinc, or aluminum.

4. (Amended) The metallic material [In a] injection machine as defined in claim 1 [, claim 2 or claim 3] wherein said spigot portion and said channel are dimensioned such that, during an injection cycle, said spigot portion and said channel are free to move axially relative to one another a distance which is less than the length of said spigot portion.

5. (Amended) The metallic material [In a] injection molding machine as defined in [claim 1, claim 2 or claim 3] claim 4 wherein said spigot portion is of a length sufficient to maintain sealing between said channel and said spigot portion during an injection cycle [and short enough to permit release of any metallic material retained between said channel and said spigot portion when a sprue is released from said channel].

6. (Amended) An improved nozzle and sprue bushing connection for a metallic material injection molding machine,

said sprue bushing having a first cylindrical sealing surface and said nozzle having a complementary second cylindrical sealing surface,

one of said first or second sealing surface being of a smaller diameter than the other, with the [said first surface, said second surface] one fitting within [first cylindrical surface to provide] the other, and

a gap being provided between said first surface and said second sealing surface,

wherein when said nozzle is engaged in said bushing, [that permits] a limited amount of metallic material [to enter the] enters said gap and [solidify in the gap] solidifies therein to form a seal, said limited amount of

material being attached to a sprue and removed therewith, said first and second surfaces being of sufficient length to permit limited axial movement therebetween without a loss of sealing between said surfaces.

7. (Amended) The improved nozzle and sprue bushing connection as defined in claim 6 wherein said nozzle and said sprue bushing further include complementary annular sealing faces [has a third cylindrical surface of similar diameter to said first cylindrical surface and wherein said first and third cylindrical surfaces are in close non-contacting relationship when said nozzle is engaged in said sprue bushing].

8. (Amended) An improved nozzle and sprue bushing connection for a metal injection molding machine,

wherein said nozzle has a first surface portion and said sprue bushing has a complementary second [which fits inside a] surface portion,

said surface portions fit closely together with one inside the other [of said sprue bushing],

wherein said close fit between said portions provides for [first portion and said surface portion are separated by] a small gap that permits a limited amount of metallic material to flow into said gap and solidify in said

gap to form a seal against leakage of a metal molding material, and

wherein said nozzle can move axially within said sprue bushing without losing sealing contact between said nozzle and said bushing.

9. (Amended) The [An] improved nozzle and sprue bushing connection as defined in claim 8 wherein said portions are cylindrical.

10. (Previously Presented) The improved nozzle and sprue bushing connection as defined in claim 9 wherein said first portion fits inside said second surface portion of said sprue bushing.

11. (Previously Presented) The metallic material injection molding machine as defined in any one of claims 1, 4, or 5 wherein said spigot portion is disposed on said nozzle, and wherein said channel is formed in said sprue bushing.

12. (Previously Presented) The improved connection as defined in claim 11 wherein said nozzle and said sprue bushing further include complementary annular sealing faces provided by a shoulder on said nozzle and a face on said

sprue bushing.

13. (Previously Presented) The improved connection as defined in claim 6 wherein said first cylindrical sealing surface on said nozzle is of a smaller diameter than said second cylindrical sealing surface on said sprue bushing.

14. (Amended) A metallic material injection molding machine nozzle and sprue bushing interface apparatus, comprising:

a spigot portion configured to be disposed in at least one of the nozzle and the sprue bushing; and

a channel portion configured to be disposed in at least one of the sprue bushing and the nozzle;

said at least one spigot portion and said at least one nozzle portion being also configured to form a gap therebetween during a molding operation to cause a limited amount of metallic material to flow into said gap and solidify in said gap to form a seal.

15. (Amended) A metallic material injection molding machine, comprising:

a mold;

an injection nozzle configured to supply metallic material to said mold;

a sprue bushing coupled to said mold;

a spigot disposed in at least one of said nozzle and said sprue bushing; and

a channel disposed in at least one of said sprue bushing and said nozzle;

said at least one spigot and said at least one nozzle being configured to form a gap therebetween during a molding operation to cause a limited amount of metallic material to flow into said gap and solidify in said gap to form a seal.

16. (Amended) A metallic material injection molding machine sprue bushing configured to interface with a nozzle tip having first and second angled surfaces, comprising:

a first sprue bushing surface configured to interface with the first surface of the nozzle tip;

a second sprue bushing surface, angled with respect to the first sprue bushing surface, and configured to interface with the second surface of the nozzle tip; and

the first and second angled sprue bushing surfaces being configured to form a gap between the first sprue bushing surface and the first nozzle tip surface during a molding operation to cause a limited amount of metallic

material to flow into the gap and solidify in said gap to form a seal.

17. (Previously Presented) A sprue bushing according to Claim 16, wherein the first sprue bushing surface comprises a cylindrically-shaped surface, and wherein the second sprue bushing surface comprises an annular-shaped surface.

18. (Previously Presented) A sprue bushing according to Claim 17, wherein the first sprue bushing surface is configured to have a larger diameter than a diameter of the first nozzle tip surface.

19. (Previously Presented) A sprue bushing according to Claim 16, wherein the first sprue bushing surface is substantially parallel to a sprue bushing longitudinal axis, and wherein the second sprue bushing surface is angled at substantially ninety degrees with respect to the sprue bushing longitudinal axis.

20. (Previously Presented) A sprue bushing according to Claim 16, wherein the first sprue bushing surface is angled at substantially ninety degrees with respect to the second sprue bushing surface.

21. (Amended) A metallic material injection molding machine nozzle tip configured to interface with a sprue bushing having first and second angled surfaces, comprising:

a first nozzle tip surface configured to interface with the first surface of the sprue bushing;

a second nozzle tip surface, angled with respect to the first nozzle tip surface, and configured to interface with the second surface of the sprue bushing; and

the first and second angled nozzle tip surfaces being configured to form a gap between the first sprue bushing surface and the first nozzle tip surface during a molding operation to cause a limited amount of metallic material to flow into the gap and solidify in said gap to form a seal.

22. (Previously Presented) A nozzle tip according to Claim 21, wherein the first nozzle tip surface comprises a cylindrically-shaped surface, and wherein the second nozzle tip surface comprises an annular-shaped surface.

23. (Previously Presented) A nozzle tip according to Claim 22, wherein the first nozzle tip surface is

configured to have a smaller diameter than a diameter of the first sprue bushing surface.

24. (Previously Presented) A nozzle tip according to Claim 21, wherein the first nozzle tip surface is substantially parallel to a nozzle tip longitudinal axis, and wherein the second nozzle tip surface is angled at substantially ninety degrees with respect to the nozzle tip longitudinal axis.

25. (Previously Presented) A nozzle tip according to Claim 21, wherein the first nozzle tip surface is angled at substantially ninety degrees with respect to the second nozzle tip surface.

26. (New) The metallic material injection molding machine as in claim 1 wherein each of said outer periphery of said spigot and said surface of said channel comprises a cylindrical surface extending substantially parallel to a longitudinal axis of said injection nozzle.

27. (New) The metallic material injection molding machine as in claim 26 wherein said outer periphery of said spigot and said surface of said channel are configured to move with respect to each other in a direction

substantially parallel to the longitudinal axis of said injection nozzle.

28. (New) The improved nozzle and sprue bushing connection as defined in claim 6 wherein each of said first cylindrical sealing surface and said nozzle complementary second cylindrical sealing surface comprises a surface extending substantially parallel to a longitudinal axis of said injection nozzle.

29. (New) The improved nozzle and sprue bushing connection as defined in claim 28 wherein said first cylindrical sealing surface and said nozzle complementary second cylindrical sealing surface are configured to move with respect to each other in a direction substantially parallel to the longitudinal axis of said injection nozzle.

30. (New) The improved nozzle and sprue bushing connection as defined in claim 8 wherein each of said nozzle first surface portion and said sprue bushing complementary second surface portion comprises a cylindrical surface extending substantially parallel to a longitudinal axis of said injection nozzle.

31. (New) The improved nozzle and sprue bushing connection as defined in claim 30 wherein said nozzle first surface portion and said sprue bushing complementary second surface portion are configured to move with respect to each other in a direction substantially parallel to the longitudinal axis of said injection nozzle.

32. (New) The metallic material injection molding machine nozzle and sprue bushing interface apparatus as in claim 14 wherein each of said spigot portion and said nozzle portion comprises a cylindrical surface extending substantially parallel to a longitudinal axis of said injection nozzle.

33. (New) The metallic material injection molding machine nozzle and sprue bushing interface apparatus as in claim 32 wherein said spigot portion and said nozzle portion are configured to move with respect to each other in a direction substantially parallel to the longitudinal axis of said injection nozzle.

34. (New) The metallic material injection molding machine as in claim 15 wherein each of said at least one spigot and said at least one nozzle comprises a

cylindrical surface extending substantially parallel to a longitudinal axis of said injection nozzle.

35. (New) The metallic material injection molding machine as in claim 34 wherein said at least one spigot and said at least one nozzle are configured to move with respect to each other in a direction substantially parallel to the longitudinal axis of said injection nozzle.